INL/EXT-05-00726

Idaho National Laboratory Comprehensive Land Use and Environmental Stewardship Report

Compiled by
Tim O'Rourke

September 2006

Idaho National Laboratory

The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

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Idaho National Laboratory
Infrastructure Optimization, Integration, and Planning
Idaho Falls, Idaho 83415

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ABSTRACT

This comprehensive land use and environmental stewardship report discusses the history of the Idaho National Laboratory including historical cultural uses, current geographical and geological conditions, and current land uses. This report also summarizes the current land use planning assumptions, environmental and resource characteristics, legacy waste site characteristics, projected end-states, and projected future land use scenarios.

SUMMARY

This report summarizes the current INL land conditions, land use planning assumptions, environmental and resource characteristics, legacy waste site characteristics, projected end-states, and projected future land use scenarios.

The Idaho National Laboratory (INL) became subject to environmental remediation efforts under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in November 1989.[1] According to current environmental remediation schedules, INL is expected to complete its major environmental remediation efforts by 2035.[2] Following environmental remediation efforts, many sites will require long-term stewardship because residual contamination will remain at levels that prohibit unrestricted access. INL will have responsibility for long-term stewardship of the Site once the U.S. Department of Energy (DOE) Office of Environmental Management cleanup mission is complete. The laboratory as part of its overall landlord responsibility will manage these activities.

The land that comprises INL has experienced a long and varied history. Located in a high desert area (about 5,000-ft elevation) known as the Snake River Plain, the INL land has served both prehistoric and modern man. Current operational activities include energy security, national and homeland security support, waste management of various hazardous and radioactive materials, spent nuclear fuel management, and environmental remediation of contaminated soils and groundwater sites.

Public land owned by the federal government is administered by the U.S. Department of Interior (DOI). Congress has authorized DOI to "withdraw" or set aside public land to meet the needs of federal agencies like DOE. Approximately 90% of INL represents land withdrawn from the public domain through four public land orders (318, 545, 637, and 1770). The site lies within five southeastern Idaho counties (Bingham, Bonneville, Butte, Clark, and Jefferson). Although there are 16 counties within 80 km (50 mi) of INL, these counties have a low population density, estimated in 2004 to be 356,234. Nearly 48% of this population resides in the two most populous counties, Bonneville and Bannock.

The infrastructure of INL includes roadways, railways, utility lines, and facilities. Transportation systems include paved public highways, nonpublic paved roads and nonpublic service roads and railroad systems. Commercial electric power is delivered to the operating areas at INL by an extensive power transmission and distribution system. There are no gas or oil lines on INL, although individual facilities may have propane or fuel storage tanks.

INL is located near the northeast end of the Snake River Plain. The land surface of INL is relatively flat, lying approximately 1,524 m (5,000 ft) above sea level. Several prominent volcanic buttes and numerous basalt flows are present in the area.

Surface water at the INL site is generally scarce. The main watercourses that cross or are near the site include the Big Lost River, the Little Lost River, and Birch Creek. Irrigation demands drain most of the streams that would

City of Idaho Falls. These campuses include the Science and Technology Campus located in Idaho Falls, the Reactor Technology Complex, and the Materials and Fuels Complex. Over the next 10 years, new onsite development, major facility decontamination and decommissioning, and specific environmental remediation will occur.

INL facility infrastructure will also be reduced over the next 10 years. These footprint reductions will occur within existing operations areas. Included in this scenario is the transformation of existing operations areas to decommissioned and institutionally controlled areas.

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FIGURES

ACRONYMS

AEC	Atomic Energy Commission
ANL-W	Argonne National Laboratory-West
ARA	Auxiliary Reactor Area
ATR	Advanced Test Reactor
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFLUP	Comprehensive Facility and Land Use Plan
CLUES	Comprehensive Land Use and Environmental Stewardship
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
EBR	Experimental Breeder Reactor
EPA	U.S. Environmental Protection Agency
ETR	Engineering Test Reactor
ESER	Environmental Surveillance, Education, and Research Program
FY	fiscal year
INEEL	Idaho National Engineering and Environmental Laboratory
INEL	Idaho National Engineering Laboratory
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MFC	Materials and Fuels Complex
MTR	Materials Test Reactor
NE	DOE Office of Nuclear Energy
NRF	Naval Reactor Facility
NRTS	National Reactor Testing Station
PBF	Power Burst Facility
ROD	Record of Decision
RPSSA	Radioactive Parts Security Storage Area
RTC	Reactor Technology Complex
RWMC	Radioactive Waste Management Complex
SL-1	Stationary Low-Lower Reactor No. 1
SPERT	Special Power Excursion Reactor Test
SSER	Sagebrush-Steppe Environment Reserve
STC	Science and Technology Campus
TAN	Test Area North
TRA	Test Reactor Area
TSF	Technical Support Facility

Idaho National Laboratory Comprehensive Land Use and Environmental Stewardship Report

1. INTRODUCTION

1.1 Overview of the Idaho National Laboratory (INL)

The Idaho National Laboratory (INL) is a science-based, applied engineering national laboratory dedicated to supporting the U.S. Department of Energy (DOE) missions in nuclear and energy research, science, and national defense.

INL is located in southeastern Idaho where it occupies an approximately 2,303 km^2 (889-mi^2) area (see Figure 1).

Battelle Energy Alliance, LLC, acting on behalf of DOE as INL site landlord, is committed to protecting the environment, its workers, and the public as it achieves its nuclear energy, national security, and multiprogram missions.

Additional contractors, subcontractors, and federal organizations perform work on the site. For example, CH2M-WG Idaho, LLC, manages the onsite environmental cleanup efforts, and Bechtel BWXT Idaho, LLC, manages the Advanced Mixed Waste Treatment Project.

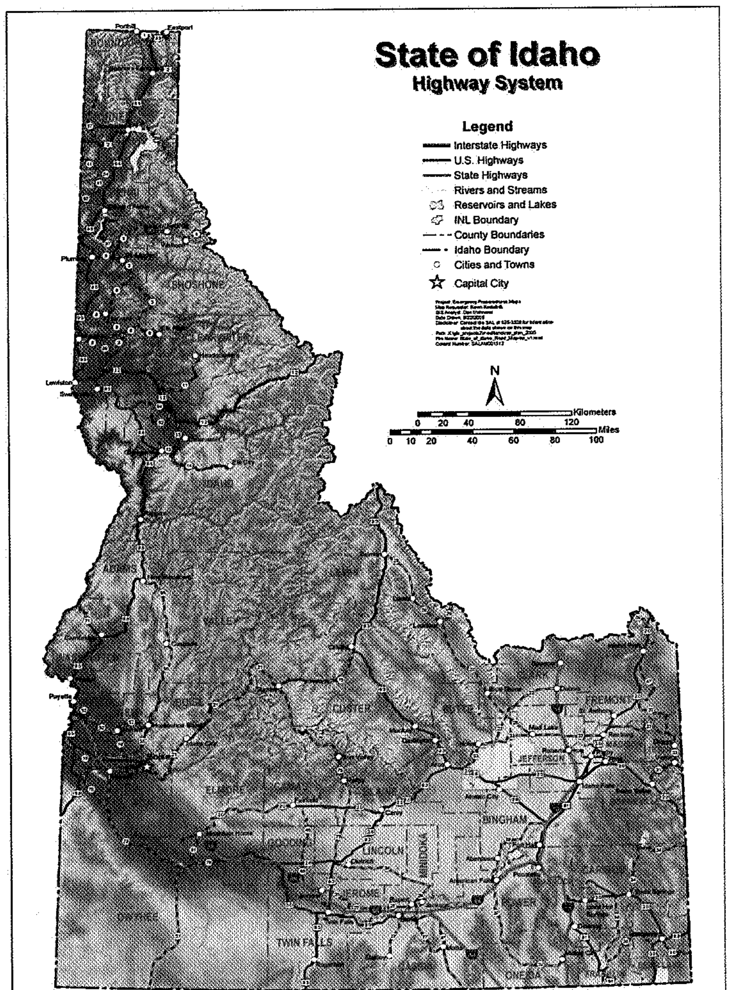

Figure 1. INL location in the State of Idaho.

The principles of environmental stewardship and adaptive management are integral to INL land management practices. Environmental stewardship is defined as the responsible management of INL lands, resources, and facilities. This broad definition includes landlord and custodial responsibilities such as environmental protection, legacy waste site management (i.e., long-term stewardship), ecological preservation, cultural resource management, sustainable infrastructure development, management of environmental records, and pollution prevention activities.

understanding of the INL land conditions. References to these data sources and projected future land use scenarios are also included.

This document is not intended to be a decision document. Any activities resulting in significant shifts in the INL mission that impact land use will follow established regulatory processes such as the National Environmental Policy Act or the Comprehensive Environmental Response, Compensation, and Recovery Act (CERCLA) and require public review and comment. Established regulatory processes such as these ensure future land use decisions that protect the environment, groundwater, and cultural resources. The planning assumptions in this document are based on planning assumptions developed with public participation during creation of the original CFLUP. The planning assumptions described here do not vary significantly from the original planning assumption in the CFLUP. Any significant changes to these assumptions from the creation of new missions or other activities at INL would require public participation via the regulatory process discussed above and revision of land use planning documents also requiring public participation.

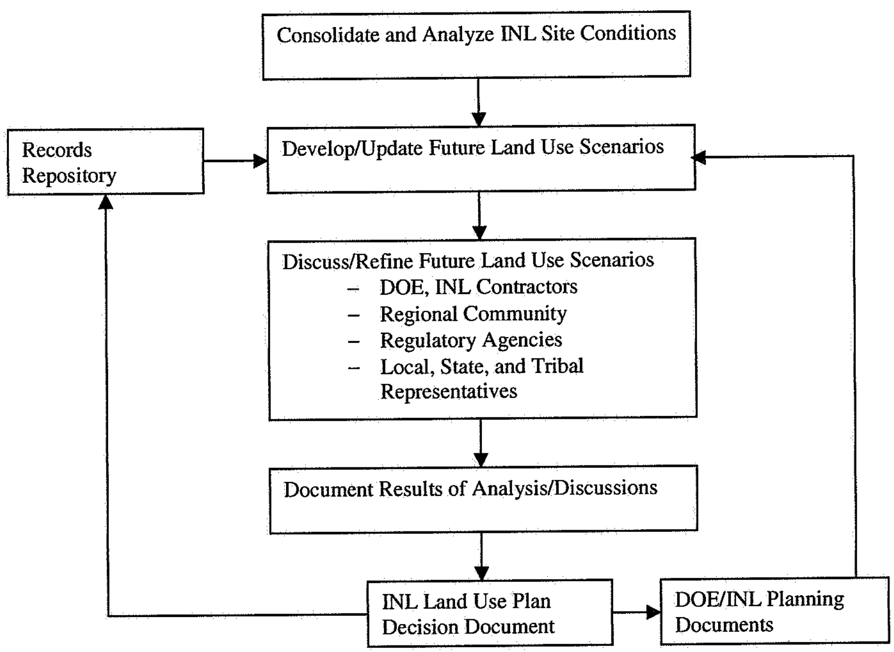

Figure 2. Summary of land use planning process.

In support of the Vietnam War, the U.S. Navy decided to reline a number of the 16-in. barrels on its battleships. To accomplish this relining, the Naval Ordnance Plant in Pocatello was reactivated to fabricate the new liners. The relined barrels were again test fired from an area near the original site at Central Facilities Area (CFA 1968–1970).

2.2.3 National Reactor Testing Station

The National Reactor Testing Station (NRTS) was created in 1949 when the newly formed AEC selected the Naval Proving Ground site as its location to perform safety tests on a variety of nuclear reactors. The Idaho site's conditions (remote, yet well serviced via the railroad spur to the Scoville center) satisfied the needs of the AEC. The large site allowed nuclear power test reactors to be located far enough apart to support various safety tests without adversely affecting other facilities.

Over the years, 52 different nuclear reactors were constructed and tested at the NRTS. The great variety of reactors tested included:

- Pressurized Water Reactor
- Boiling Water Reactor
- Gas-Cooled Reactor
- Liquid Metal Cooled Reactor
- Heavy Water Reactor
- Organic Moderated Reactor
- Pool Type Reactor.

Refer to the INL's webpage for additional information concerning these nuclear reactors.[18]

In general, these reactors were used in tests to determine their performance and response to severe accident conditions. Because of the nature of the testing, the prevailing strategy of the time was to isolate the test reactor facilities away from other operations. An example of this strategy is evidenced at the Experimental Breeder Reactor-I (EBR-I). On December 20, 1951, EBR-I made history by producing electricity from atomic energy. Today, EBR-I is preserved as a National Landmark site (see Figure 3).

In addition to reactor safety, testing at the NRTS site focused heavily on other aspects of nuclear technology. Much of this work was performed at the Test Reactor Area (now the Reactor Technology Complex [RTC]), the Idaho Chemical Processing Plant (now the Idaho Nuclear Technology and Engineering Center [INTEC]), and Test Area North (TAN).

In 1947, the AEC approved the Idaho site as its new NRTS. By 1950, jurisdiction over land within the Naval Proving Ground had been transferred from the Navy to the AEC, and an additional 232,678 acres had been transferred from the public domain to the AEC for use in atomic-energy research and development. Over the next 10 years, AEC made additional land acquisitions. In 1958, a withdrawal of about 120,345 acres was made and added to the INL lands, bringing the total land withdrawn from the public domain to 505,832 acres (89% of the current-day INL site). In 1975, the Energy Research & Development Administration replaced AEC, and in 1977, DOE replaced the Energy Research & Development Administration.

Public land owned by the federal government is administered by the U.S. Department of Interior. As such, the Bureau of Land Management (BLM) has certain administrative responsibilities. These responsibilities include the administration of grazing permits on the land; granting utility rights-of-way across the land; extracting materials; and controlling wildfires, weeds, insects, and predators.

Congress has authorized the U.S. Department of Interior to "withdraw" or set aside public land to meet the needs of federal agencies like DOE. Withdrawals occur through a mechanism known as a public land order. The INL lands were withdrawn from the public domain through public land orders # 318, 545, 637, and 1770. The public land orders do not have specific time limitations; therefore, authority to administer these lands is expected to remain with DOE for the foreseeable future.

In addition to the land that was withdrawn from the public domain, several parcels of state-owned land (21,308 acres) as well as land from private parties (43,275 acres) were obtained to form the intact land area comprising the current boundaries of the INL site.

The eastern boundary of INL changed slightly in the late 1970s and again in the mid-1990s. The first change was made to compensate farmers who had lost productive farmland because of the catastrophic failure of the Teton Dam. The second change involved the sale of land to Jefferson County for a regional landfill. For both of these transfers, DOE relinquished that portion of their land withdrawal back to BLM, which in turn sold the land. The current-day INL land area consists of 569,135 acres (2,303 km^2 [889 mi^2]). Figure 4 illustrates the land ownership conditions of INL.

3. PLANNING ASSUMPTIONS FOR INL LAND USE AND ENVIRONMENTAL STEWARDSHIP

When developing long-term land use scenarios, assumptions must be made to provide a basis on which future development patterns can be formulated. The intent of these assumptions is to address the inherent uncertainty that is associated with future events. Over time, these assumptions may require modification as unanticipated events occur or conditions change.

Several considerations formed the basis for the current INL Land Use planning assumptions.[19] These include prior land use planning assumptions, consideration of prior related public concerns as expressed via the INL Citizens Advisory Board and the Environmental Management Site-Specific Advisory Board, and incorporation of the DOE and the INL management team's strategic vision for INL. The following land use planning assumptions were made to form this report:

- INL will achieve its vision of becoming the preeminent nuclear research, development and demonstration laboratory and a major center for national security technology development and demonstration, and remain a multiprogram national laboratory.
- INL, and its associated 2,303 km^2 (889 mi^2), will remain under federal government management and control for at least the next 100 years.
- Portions of INL will remain under federal government management and control in perpetuity.
- New buildings will be constructed on INL to provide state-of-the-art research capabilities that are necessary to fulfill its mission.
- New building construction may include structures in existing facility areas as well as construction of new facility areas.
- To the extent practical, new building construction will be encouraged in existing facility areas (Science and Technology Campus [STC], RTC, and Materials and Fuels Complex [MFC]) to take advantage of existing infrastructure.
- Construction of new facility areas should occur in the identified core infrastructure areas.
- As INL implements its mission, research and development advancements will result in the obsolescence of existing buildings.
- As contaminated facility areas become obsolete, environmental remediation, decommissioning, and decontamination will be required.
- The environmental remediation, decommissioning, and decontamination process will be completed in accordance with the existing regulatory structure.
- The federal government will authorize and appropriate sufficient funds to provide adequate controls (i.e., institutional controls and/or engineered barriers) for areas that pose a significant health and/or safety risk to the public and workers until that risk diminishes to an acceptable level for the intended purpose.

4. REGIONAL SETTING

4.1 INL Location

The property of INL, encompassing 2,305 km^2 (889 mi^2), lies within five southeastern Idaho counties, Bingham, Bonneville, Butte, Clark, Jefferson (see Figure 5). The INL site measures approximately 58 km (36 mi) from north to south and approximately 58 km (36 mi) from east to west at its broadest point. INL is 212 km (132 mi) southwest of Yellowstone National Park, 377 km (234 mi) north of Salt Lake City, Utah, and 319 km (198 mi) east of Boise, Idaho. The eastern boundary of the INL Site is 39 km (24 mi) west of Idaho Falls, Idaho.

In addition to the Site, INL currently maintains 32 buildings within the City of Idaho Falls, Idaho. The functions performed at these facilities include basic research, applied engineering and administrative services.

4.2 Regional Population

There are 16 counties within 80 km (50 mi) of INL. Fifteen of these counties are in the State of Idaho, and one is in the State of Montana. This 16-county region has a low population density. As of 2004, the Bureau of the Census estimated the population for this region to be 356,234. Nearly 48% of this population resides in the two most populous counties, Bonneville and Bannock.

The largest regional cities are Idaho Falls (located in Bonneville County) with 52,148 residents, and Pocatello (located in Bannock County), with 50,723 residents. These two cities represent approximately 30% of the regional population.

The entire INL is an administratively controlled area. Admittance to the INL Site and its facilities is permitted only on an "official business" basis. There are no human residences on the INL property. A regional perspective of the INL Site and surrounding population centers is shown in Figure 6. Refer to Figure 7 for a more detailed view of the regional population, based on 2000 Census Blocks.

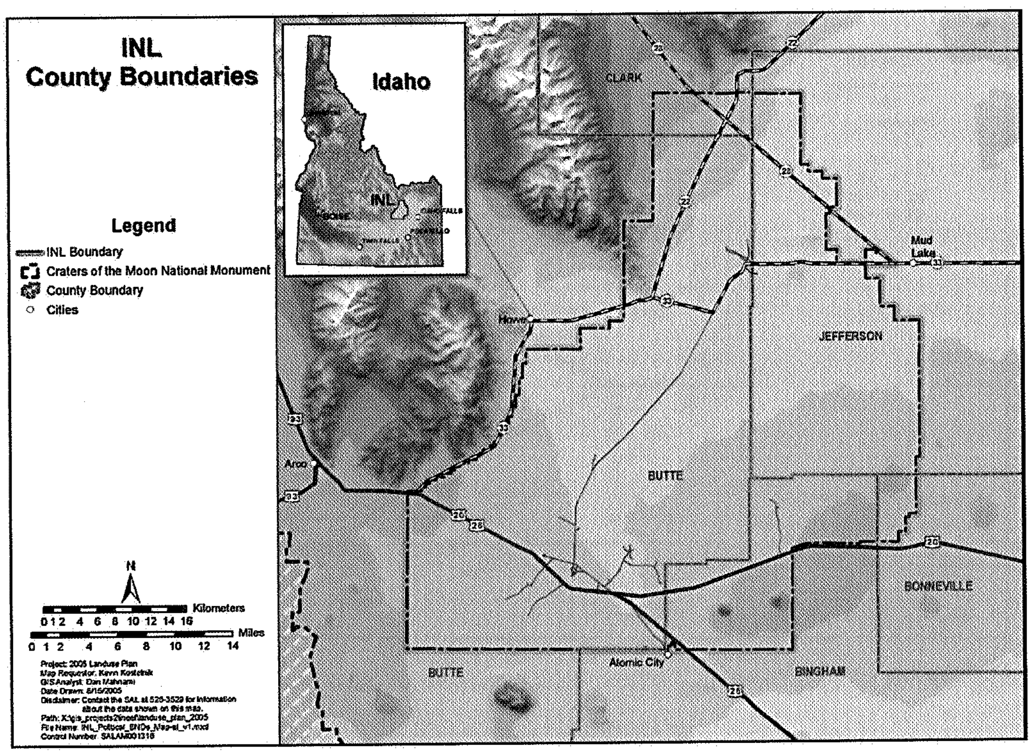

Figure 5. INL county boundaries.

4.3 Regional Land Use

The region adjacent to the INL boundary is a combination of public and private land. Approximately 75% of the land adjacent to INL is managed by the federal government and administered by the BLM. The BLM classifies much of this land as agricultural and ranching. This federally managed land provides wildlife habitat and is used for mineral and energy production, grazing, and recreation.

Approximately 1% of the adjacent land is owned by the State of Idaho. This land is used for the same purposes as the federal land. The remaining 24% of the land adjacent to INL is privately owned and is primarily used for grazing and crop production.

Approximately 1,100,000 acres of cropland are in use each year within the immediate seven-county area surrounding INL. In addition, this area produces approximately 105,000 head of livestock (primarily beef cattle) annually. As such, population densities are generally low, with urban and suburban land uses spatially distant.

The Bitterroot, Lemhi, and Lost River Mountain ranges border INL on the north and west. The Big Southern, Middle, and Eastern Buttes border INL on the south. Significant portions of these primarily federal-owned lands are used for recreational purposes, such as hunting, fishing, boating, hiking, cross-country skiing, and camping.

Specific recreational and tourism sites are located near INL at the Craters of the Moon National Monument, Hell's Half-Acre Wilderness Study Area, Black Canyon Wilderness Study Area, Camas National Wildlife Refuge, Market Lake State Wildlife Management Area, Mud Lake Wildlife Management Area, and the Birch Creek Camping Area. In addition, there are two national forests, Challis-Salmon and Targhee-Caribou, within 80 km (50 mi) of the north and west INL boundaries, respectively.

A DOE-owned railroad track also passes north at the Scoville Siding from the Mackay Branch through the INL CFA, past the east side of INTEC, and terminates within the Naval Reactors Facility (NRF). A spur line runs west to connect this track through the south end of the INTEC Fuel Storage Facility (CPP-603) and to the coal-fired plant. A portion of this line is presently out of service.

5.1.1.3 Airways. The cities of Idaho Falls and Pocatello both have airports that provide passenger and cargo service in the vicinity of INL. The Federal Aviation Administration requests that pilots avoid flights below 1.8 km (6,000 ft) above mean sea level when crossing INL. INL operates a 305 × 30-m (1,000 × 100 ft) airfield for testing of unmanned aerial vehicles.

5.1.2 Utilities

Commercial electric power is delivered to the operating areas at INL by an extensive power transmission and distribution system. Off-Site power is fed into the INL power transmission system through the Scoville substation. Power to the Scoville substation (and, hence, INL) is provided via two transmission lines from the Utah Power and Light Company's Antelope substation.

The INL power system includes a 138-kV transmission loop 100 km (62 mi) long that feeds high-voltage substations. A separate 10-km (6.2-mi) 138-kV line feeds the Radioactive Waste Management Complex (RWMC) area with capacity in excess of 20 MW. The distribution system ranges in voltage from 13.8 to 2.4 kV and is composed of approximately 97 km (60 mi) of overhead lines and several miles of underground lines. The transmission loop capacity is 50 MW. There are no gas or oil lines on INL, although individual facilities may have propane or fuel storage tanks.

5.2 Environmental Characteristics

5.2.1 Topography

Figure 9 details the topography of the INL. The Lost River and Lemhi Ranges and the mouths of the valleys of the Big Lost and Little Lost Rivers bound the INL site on the west and northwest. On the north, the mouth of the Birch Creek Valley and the southern tip of the Beaverhead Mountains of the Bitterroot Range bound the site on the Idaho-Montana border. Features to the south and east of the site are similar to those found on the site, characterized by relatively flat topography punctuated by several prominent volcanic buttes and numerous basalt flows. The average surface elevation on INL is approximately 1,500 m (5,000 ft) above sea level, although isolated buttes reach elevations of nearly 2,000 m (6,600 ft). Peaks to the immediate north and west of the site borders approach 3,300 m (11,000 ft). The predominant topographic features within the boundaries of the INL site are the Twin Buttes (Middle and East Buttes). Big Southern Butte, located approximately 4 km (2.5 mi) south of the site boundary, is the tallest surface feature within the Snake River Plain, reaching an elevation of 2,300 m (7,600 ft). These buttes provide the most conspicuous evidence of the volcanic origin of the Snake River Plain, although numerous smaller buttes, cinder cones, lava outcrops, and lava tubes may be found in the area.

A distinct linear feature known as the principal lineament was conspicuous on the earliest aerial photographs of INL. This feature is discernible on satellite images as a dark line extending north and south from the corner of the INL boundary just northeast of East Butte; it lies along the eastern edge of a large area of relatively high albedo that extends to the northeast from Middle Butte. Several theories on the origin of the principal lineament have been proposed. For a summary of these theories, refer to the INL Environmental Surveillance, Education, and Research (ESER) Program (see Reference 13).

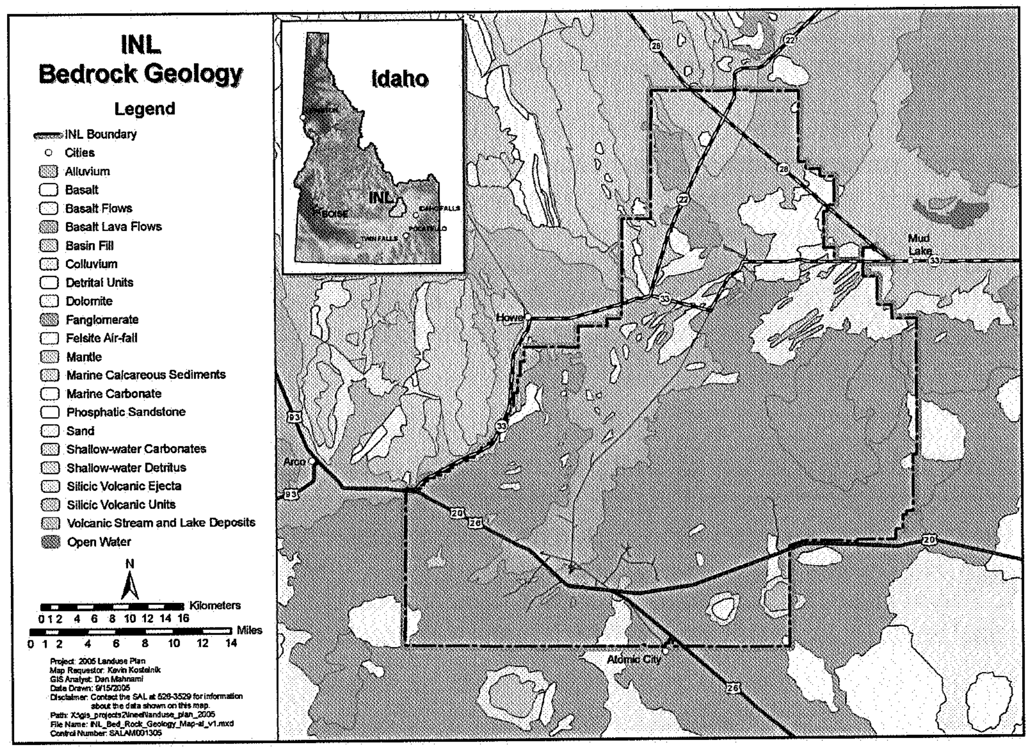

Figure 10. INL bedrock geology.

5.2.3 Surface Soils

Despite the fact that the subsurface geology of the INL site is dominated by basalt, most soils found on the INL site are derived from older silicic volcanic and Paleozoic rocks from the surrounding mountains. These materials are deposited as sediments transported to the area by wind, water, or gravity.

A thin layer of eolian, or wind-borne sediments, covers virtually all the INL area. The soils formed by these sediments range in texture from the fine-grained, wind-blown glacial loess left behind by retreating glaciers during the Pleistocene to sand believed to have originated from the Big Lost River and the Snake River and from the shorelines of the ancient Lake Terreton. Because of the uneven, broken surface of the basalt base, the depths of eolian deposits vary from a few centimeters to over 2 meters.

In addition to this long-term eolian deposition, INL and surrounding areas have been subject to at least two distinct episodes of major loess deposition during the past 200,000 years, with the most recent episode occurring some 10,000 years (see Reference 22). Soils derived from these two major depositional events are markedly distinct—subsoils in the younger deposits contain high amounts of carbonates accumulated over many years of low rainfall and high evaporation rates, whereas soils from the older loess deposits developed during periods of higher precipitation. In these soils, salts have been leached out of the subsoil, and fine particles (clays) have been deposited from the surface to the subsoil. Subsoil horizons of the older soil have relatively high amounts of clay rather than carbonates.

Alluvial soils are the result of the deposition of water-borne sediments. On the INL site, most alluvial soils are found on the western and northern portions of the site, specifically near the Big Lost River flood plain, on the small alluvial fans below the bordering mountains, and within the large alluvial fan of Birch Creek (see Reference 3). The Big Lost River and Birch Creek, as well as the Little Lost River, originally fed the ancient Lake Terreton, which occupied much of the northern part of INL.

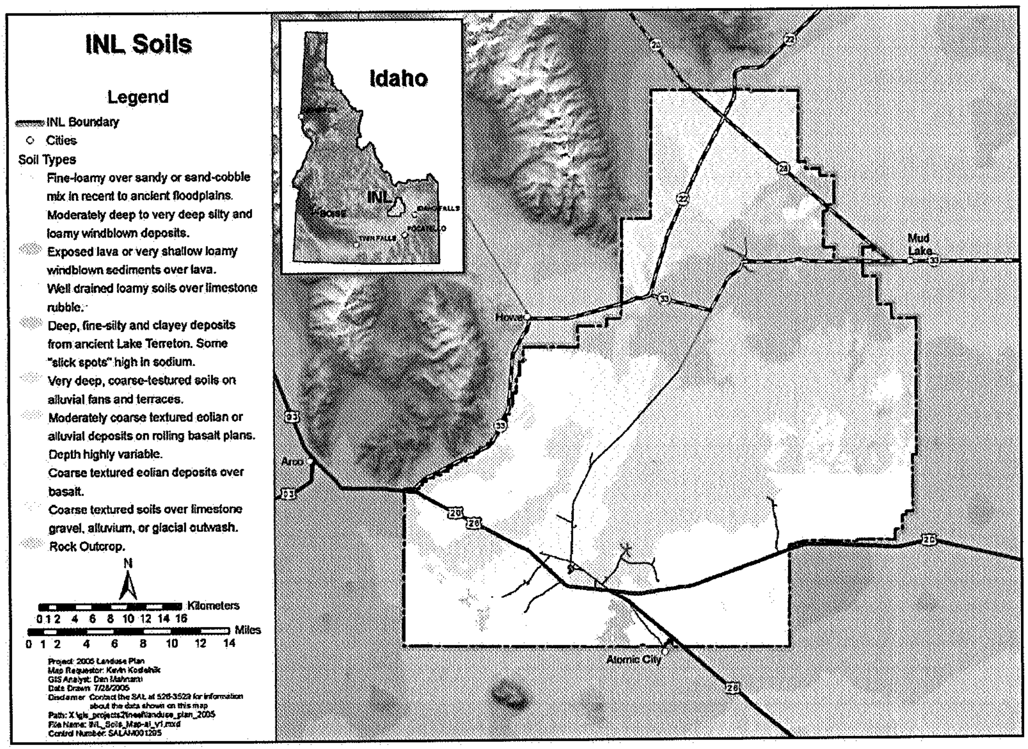

Figure 11. INL soils.

5.2.4 Water

5.2.4.1 Surface Hydrology. The INL Site overlies 2,305 km^2 (890 mi^2) on the northern edge of the Eastern Snake River Plain. Using the United States Geological Survey's surface water classification scheme, the INL Site straddles portions of six (possibly seven) watersheds. These watersheds include: American Falls, Big Lost River, Birch Creek, Idaho Falls, Little Lost River, Medicine Lodge, and possibly a small portion of Lake Walcott (see Table 1). Of these watersheds, only four contain significant surface water bodies that flow onto or near the Site. These include the Big Lost River, Birch Creek, Little Lost River, and Medicine Lodge watersheds. All surface water within them is lost to either evapotranspiration or via infiltration to their local aquifers and the regional Eastern Snake River Plain aquifer near or beneath the Site.

The American Falls watershed drains approximately 39% of the Site primarily around MFC and the Power Burst Facility (PBF). It is a relatively large watershed that straddles the north and south sides of the Snake River.

The Big Lost watershed is a 4,921-km^2 (1,900 mi^2) watershed that drains approximately 34% of the Site. Flows in the Big Lost River are usually diminished by evaporation, irrigation diversions, and infiltration losses along the river channel. Generally, Big Lost River flows do not reach the Site boundary during periods of low runoff. However, during periods of medium to high runoff, the river flows onto the Site. Depending on the amount of water flowing in the river, a portion or all the flows can be diverted to the INL Diversion System. Flows that remain in the river channel then flow northeastwardly in a concave arch toward its terminus in the Big Lost River playas, near TAN. The Big Lost River is important to INL because most major INL facilities are located along the Big Lost River corridor.

The Idaho Falls watershed drains approximately 1% of the Site east/southeast of MFC. It is a 2,953-km^2 (1,140-mi^2) watershed that straddles the east and west sides of the Snake River. No INL facilities are located in this watershed.

The Little Lost River watershed drains approximately 3% of the Site. It is a 2,479-km^2 (957 mi^2) watershed originating on the eastern slope of the Lost River Mountains and the western slope of the Lemhi Mountains. This watershed does not include any INL facilities, and the Little Lost River is not known to have flowed onto the Site.

The Medicine Lodge watershed drains approximately 9% of the Site. It is a long, thin 2,466 km^2 (952-mi^2) watershed east of TAN. The most significant surface water resource in this unit is Mud Lake, just north of the town of Terreton, east of the Site. There are no permanent streams on or near the Site, and no INL facilities are located in this watershed.

The Lake Walcott watershed may or may not drain a portion of the INL Site. The Lake Walcott watershed is a relatively large watershed that straddles the north and south sides of the Snake River. If it does intersect the INL boundary, only a very minor portion (<1%) of it would be associated with the Site. No INL facilities are located in this watershed.

5.2.4.2 Wetlands. The U.S. Environmental Protection Agency (EPA) defines wetlands as "areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.3(t)).[27]

The United States Fish and Wildlife Service (USFWS) as part of a 1992 preliminary survey conducted an evaluation of aquatic habitats at the Site for the National Wetlands Inventory. This inventory identified and mapped approximately 135 areas within the boundaries of INL. Of these areas, 121 INL wetlands were surveyed, grouped into five wetland categories (palustrine and lacustrine, riverine, manmade, unmapped, and unclassified). Jurisdictional wetlands, governed by the Clean Water Act (33 USC 1251-1376),[28] are those wetlands that exhibit: (1) a prevalence of hydrophytic plants, (2) hydrological conditions suited to such plants, and (3) the presence of hydric soils. The only area of the Site identified as potentially jurisdictional wetlands is the Big Lost River Sinks.

Additional information concerning this mapping can be obtained in *A Preliminary Survey of the National Wetlands Inventory as Mapped for the Idaho National Engineering Laboratory.*[29]

5.2.4.3 Groundwater Hydrology. Five aquifers are associated with the Site: the Big Lost River Valley aquifer, Birch Creek Valley aquifer, Copper Basin aquifer, Little Lost River Valley aquifer, and the Eastern Snake River Plain aquifer. The Big Lost River, Little Lost River, Birch Creek, and Medicine Lodge aquifers are tributary to the Eastern Snake River Plain aquifer. The exact boundaries between these tributary aquifers and the Eastern Snake River Plain aquifer are not well known.

The Eastern Snake River Plain aquifer is the most significant aquifer relative to the Site because it underlies the vast majority of the Site. All the water used by INL is supplied by the Eastern Snake River Plain aquifer in accordance with a Federal Reserve Water Right negotiated between the DOE and the State of Idaho.[30] INL is permitted a water pumping capacity of 80 ft^3/s and a maximum water consumption of 35,000 acre-feet per year. On average, however, INL withdraws approximately 6,229 acre-feet per year. About 65% of these withdrawals are eventually returned to the aquifer via percolation. Consequently, the annual consumptive usage of water withdrawn from the aquifer is about 2,200 acre-feet per year.

within disturbed areas. These species may be altering the overall structure of the plant communities in the region, and in the case of cheatgrass, may also be dramatically altering the fire regime. Crested wheatgrass, a European bunchgrass seeded in the late 1950s, dominates many disturbed areas where it was used to provide cover and to hold soils (see Figure 14).

The most common shrub on INL is Wyoming big sagebrush, although basin big sagebrush may dominate or be codominant with Wyoming big sagebrush on sites having deep soils or sand accumulations.[32] Wyoming big sagebrush communities occupy most of the central portions of INL. Green rabbitbrush is the next most abundant shrub, and other common shrubs include winterfat, spiny hopsage, gray rabbitbrush, broom snakeweed, and horsebrush. Communities dominated by Utah juniper and three-tipped sagebrush, black sagebrush, or both are limited to areas along the INL periphery, specifically on the slope of the buttes and on the foothills of adjacent mountain ranges to the northwest. Salt-desert shrub communities may be found on the sediments in the sinks and playas associated with the Big Lost River and Birch Creek. These communities are dominated by shadscale, Nuttall saltbush, or winterfat.

The understory grasses include natives such as thick-spiked wheatgrass, bottlebrush squirreltail, Indian rice grass, needle-and-thread grass, and Nevada bluegrass. Creeping wild rye and western wheat grass may be abundant locally. Communities dominated by basin wild rye are common in depressions between lava ridges and in other areas having deep soils. Bluebunch wheat grass is common at slightly higher elevations in the southwest and east of INL.

Vegetation communities within the INL boundaries contain an unusually high diversity of forbs due largely to the exclusion of livestock grazing common throughout the sagebrush-steppe region. Forb species are numerous, but not abundant in many areas. Common forbs include tapertip hawksbeard, Hood's phlox, Prickly phlox, Hoary false yarrow, globe-mallow, evening primrose, bastard toadflax and various paintbrushes, buckwheats, lupines, milkvetches, and mustards.

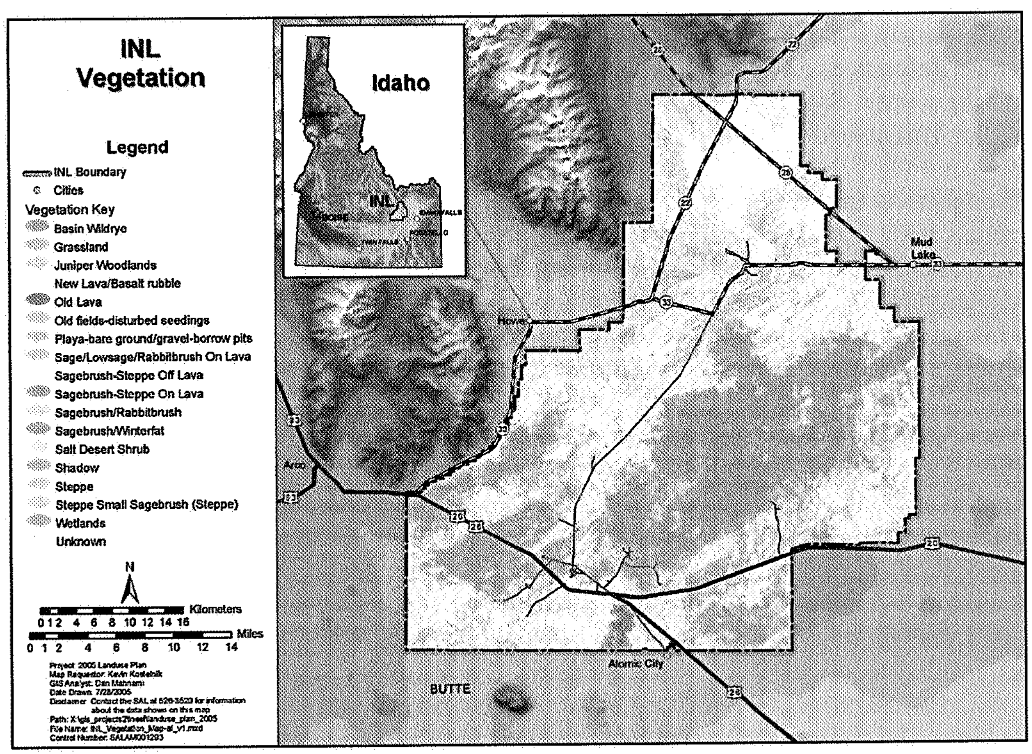

Figure 14. INL vegetation.

nutrient cycling and energy flow.[37,38] At the nearby Craters of the Moon National Monument, where a thorough inventory of invertebrates has been done, 2,064 species were found; therefore, many more insect species may be present at the INL.

In 1995 and 1997, an INL team conducted a survey of plants and aquatic invertebrates in the area. Although by no means comprehensive, the field team observed eighteen species of waterfowl and shorebirds (including over 500 ducks, some with broods) and several other bird species, including two Peregrine Falcons. Thousands of ephemeral Great Basin spadefoot toads were observed, as were invertebrates representing many different orders. Although remnants of these systems remain, the long-term impact of the various water diversion systems on the aquatic communities is uncertain.

5.2.5.2.1 Endangered or Threatened Wildlife — The USFWS provides a list of threatened and endangered species and other species of concern for the INL site. The most recent USFWS list (December 2004) includes two threatened and endangered species for the site: bald eagle (*Haliaeetus leucocephalus*) and gray wolf (*Canis lupus*). The gray wolf is a recent addition to the INL list but is designated as an "experimental/non-essential population." The USFWS has also designated several other animal species as well as one plant species as sensitive. Mammals receiving this designation are Merriam's shrew (*Sorex merriami*), pygmy rabbit (*Brachylagus idahoensis*), Townsend's big-eared bat (*Corynorhinus townsendii*), long-eared myotis (Myotis evotis), and small-footed myotis (*Myotis subulatus*). The three birds listed are the ferruginous hawk (*Buteo regalis*), greater sagegrouse (*Centrocercus urophasianus*), and the long-billed curlew (*Numenius americanus*). The northern sagebrush lizard (*Sceloporous graciosus*) is the single reptile on the USFWS list, and painted milkvetch (*Astragalus ceramicus var. apus*) is the only plant.

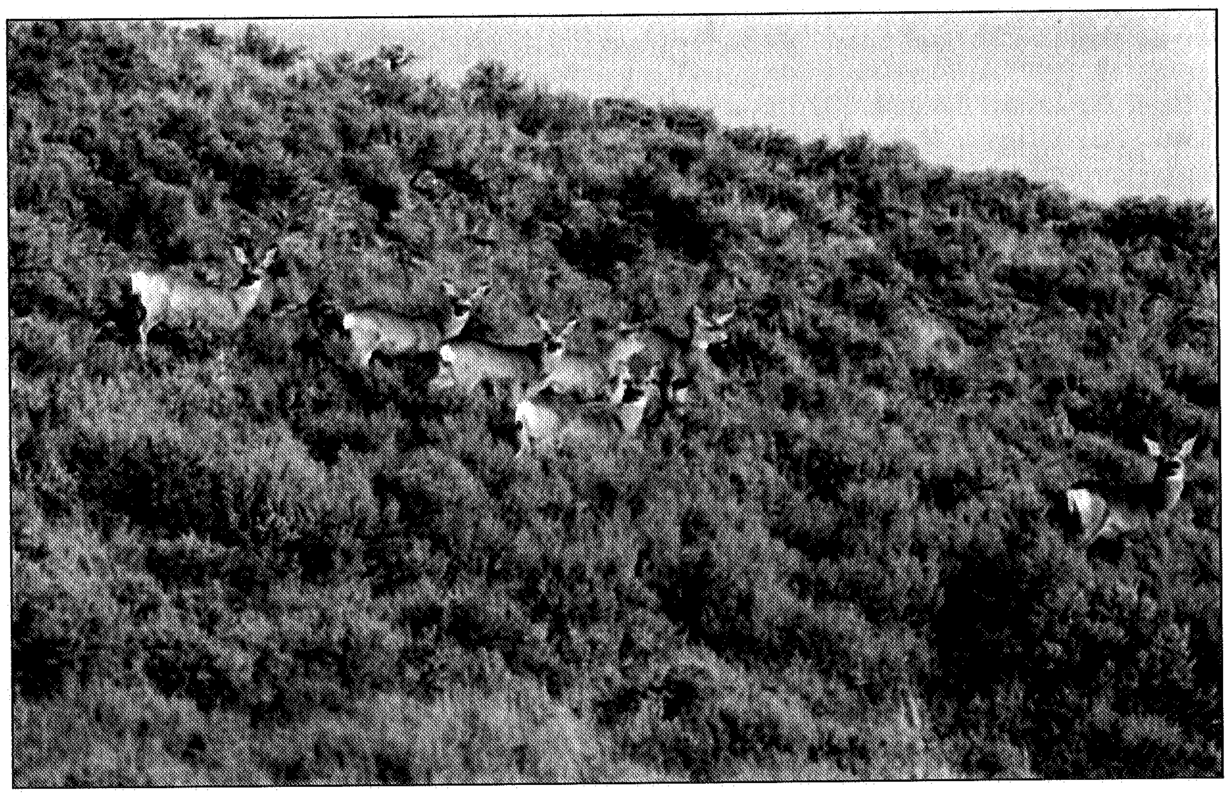

Figure 15. Mule deer on the INL site.

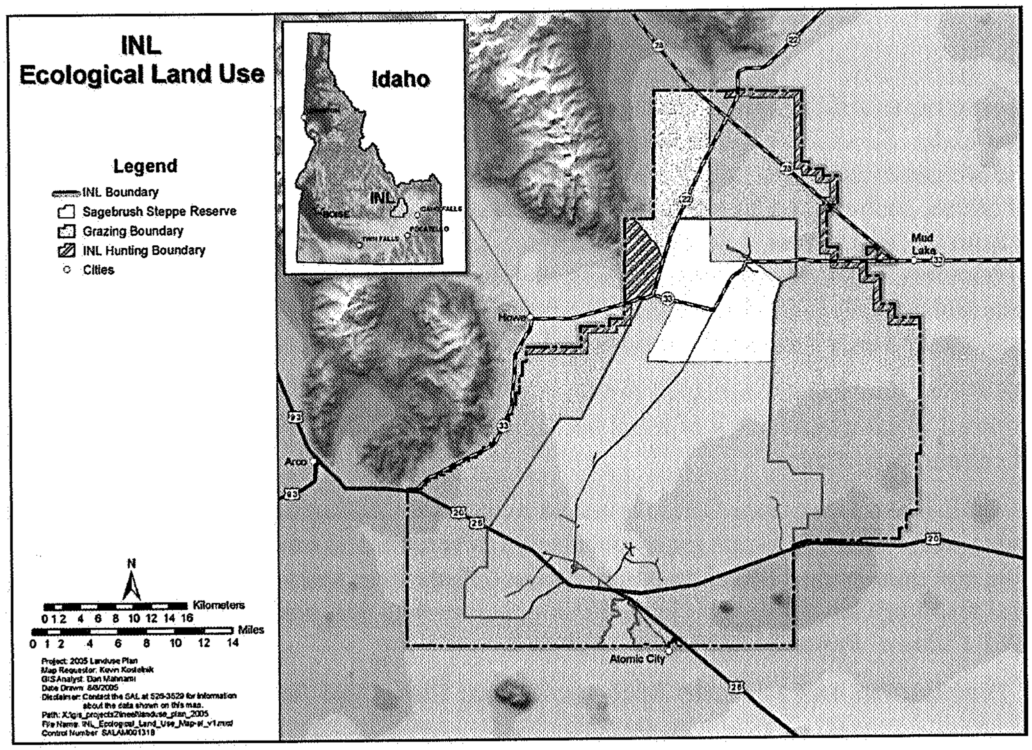

Figure 16. INL ecological land use.

5.5 Permitted Public Use

INL provides an important habitat for big game. Big game use of adjoining farmlands, however, has resulted in depredation concerns. In an effort to control this situation and reduce crop damage caused by wild game on adjacent private agricultural lands, the DOE cooperates with the IFG in allowing limited, controlled hunts for elk and antelope. These hunts, managed in accordance with an existing DOE/IFG memorandum of agreement, represent a form of limited and permitted public use of INL. This use is restricted to certain species and specific locations, as illustrated in Figure 16.

Thirty-four species observed at INL are considered game species. Of these, waterfowl constitutes the largest number of species present. Waterfowl use wetland and riparian habitat associated with the Big Lost River and ponds or impoundments at INL facilities. However, the most common game species are the mourning dove, pronghorn, and sagegrouse found in upland habitats.

INL does not lie within any of the land boundaries established by the Fort Bridger Treaty of 1868. The provision in the Fort Bridger Treaty that allows the Shoshone-Bannock Tribes to hunt on unoccupied lands of the United States does not presently apply to any land upon which INL is located because the entire INL is considered to be occupied by DOE.

5.6 Mineral Rights Ownerships

The subsurface mineral rights associated with INL are managed by the BLM. Additional information regarding the management of these resources is available from the local Idaho Falls BLM Office.

9. Officers' Quarters (CFA-613)
10. Proofing Area (CFA-633)
11. Central Facilities WWII Pumphouse (CFA-642)
12. Central Facilities WWII Pumphouse (CFA-651)
13. Chemical Processing Building (CPP-601) scheduled for demolition
14. Heat Transfer Reactor Experiment (HTRE-2)
15. Heat Transfer Reactor Experiment (HTRE-3).

5.8 Natural Hazards

5.8.1 Wildland Fires

The hot, dry summers characteristic of eastern Idaho predispose sagebrush steppe communities to a history of recurring fire. Estimates of fire return intervals for sagebrush steppe systems range from around 20 to over 100 years.[41,42,43] It has been hypothesized that the natural interval between fires in these systems must be sufficiently long to allow big sagebrush, which does not resprout, to regain dominance through recolonization of burned sites from seed. Otherwise, these areas would become dominated by root-sprouting shrubs such as horsebrush or rabbitbrush (see Reference 43).

Numerous fire scars are evident in aerial photographs and satellite images of the INL site. The scars of several fires that have burned during this century have been mapped from satellite imagery or aerial surveys. One of the largest of these fires occurred in 1994, starting near the junction of Highways 20 and 22 on the western boundary of INL and extending a distance of almost 25 km (15.5 mi). See Figure 17. Information on this and other fires can be found on the ESER web site (see Reference 3). A map of the more recent large fire scars on INL is illustrated in Figure 18.

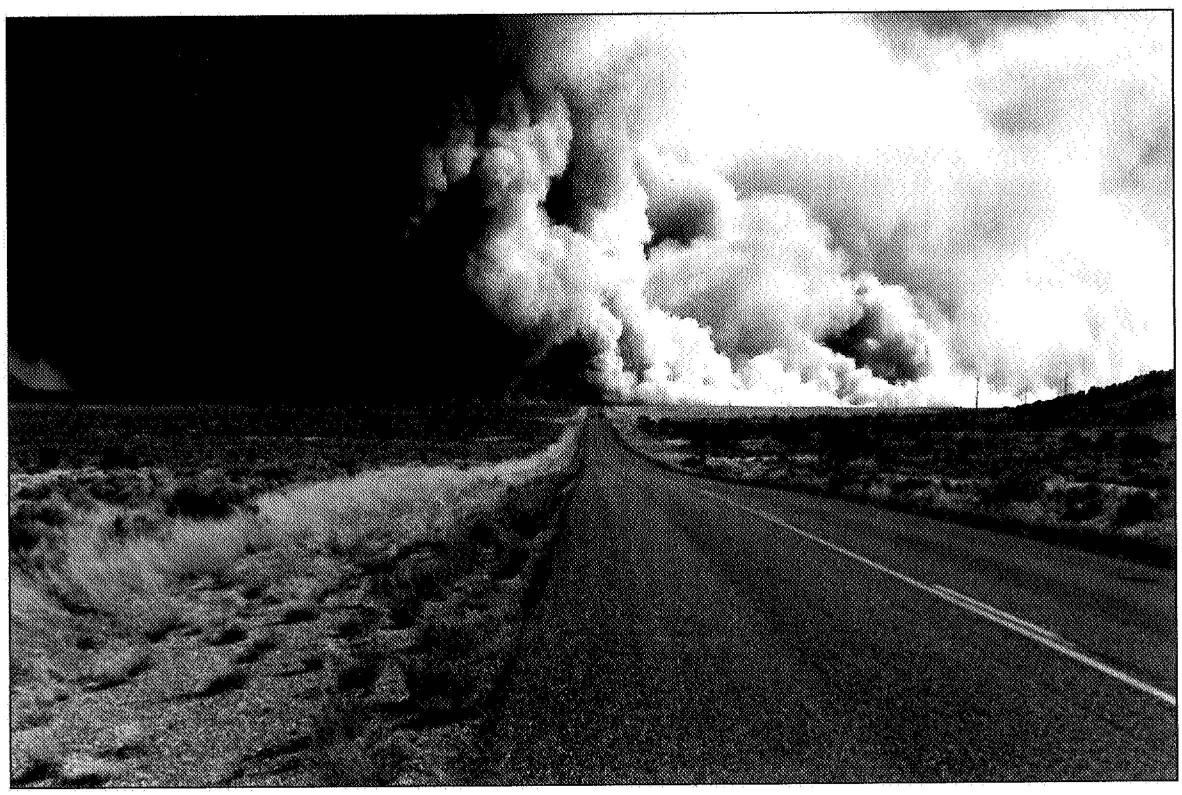

Figure 17. Wildland fire on the INL site.

be regulated by the diversion dam headgates. Water diverted to the spreading areas either evaporates or infiltrates to the Eastern Snake River Plain aquifer. The diversion channel is capable of carrying 7,200 ft^3/s from the river into the spreading areas.[45] Two low swales located southwest of the main channel can carry an additional 2,100 ft^3/s, producing a combined diversion capacity of 9,300 ft^3/s (see Reference 45). Water diverted to the spreading areas either evaporates or infiltrates to the aquifer. Water remaining in the Big Lost River channel continues to flow northeastwardly to the Big Lost River playas, near TAN.

Riverine flooding has also occurred along Birch Creek near TAN as a result of ice jams. Due to concerns about the potential for flooding at TAN, in 1969 the INL constructed channels and began diverting the water to several gravel pits east of TAN. Most of the flows are lost to seepage in the lower portions of the valley before flowing onto the Site boundary. However, Birch Creek does flow onto the Site during high water years, and it can negatively impact several TAN facilities if not diverted, especially when there is severe icing in the channel.

5.8.2.1 Big Lost River 100-Year Flood. Several studies have calculated the potential magnitude of a 100-yr flood for the Big Lost River at the Arco gauging station (a station 22.5 km [14 mi] upstream from the INL diversion dam). The first calculated value of the mean 100-yr flood magnitude range from 3,700 to 7,200 ft^3/s.[46,47,48,49] This range is attributed to the type of analysis, the data sets being used, the region of the river that was being analyzed, and other inherent assumptions used in the analysis. A study using paleohydrologic data collected from several stream reaches along the Big Lost River below the Arco station in combination with historical stream gauge data from the Arco station estimates a magnitude of 3,300 ft^3/s for the 100-yr flood for the Big Lost River at the Arco station.[50] Subsequently, the USGS revised their estimate to be 3740 ft^3/s with a 95% uncertainty ranging from 1395 to 6250 ft^3/s (see Reference 49). Comments to topographic data used in Reference 50 prompted a revision to their previous estimate. After revisiting the basin topography, the newest estimate of the 100-yr flood magnitude is 3,070 ft^3/s.[51] Figure 19 illustrates the 100-yr flood plane on INL using this magnitude and assuming that there is no infiltration, and an upstream diversion dam does not exist.

Flooding at INL is further complicated by the construction of the INL diversion dam. This dam was built to control flow onto the Site protecting the downstream facilities from flooding. Gates placed on two large, corrugated steel culverts control flow onto the Site and limit the flow of the Big Lost River to less than 900 ft^3/s downstream of the diversion dam.[52] Although the INL diversion channel was designed to handle flows in excess of 7,200 ft^3/s (see Reference 45), a recent field investigation pertaining to the structural integrity of the INL diversion dam by the Army Corps of Engineers[53] indicates the safe holding flowrate at the diversion dam is now thought to be about 7,300 ft^3/s. The diversion dam control of the flow of the Big Lost River and mean value of the most recent estimate of the 100-yr flood (3,070 ft^3/s) on the Big Lost River suggest that the 100-yr flood would be contained by the diversion dam posing no flood threat to INL facilities

5.8.2.2 Big Lost River Floods with Return Periods Greater Than 100 Years. Ostenna et al. (see Reference 50) performed a Bayesian flood-frequency analysis that indicates peak flows on the Big Lost River with return periods of 500, 1,000, and 10,000 years are 4,000, 4,400, and 5,300 ft^3/s, respectively. These results suggest that exceedance of the estimated maximum capacity of the INL diversion dam of 9,300 ft^3/s (see Reference 45) has an extrapolated annual exceedance probability smaller than 0.00001 (or greater than 100,000-year return period). Assuming a safeholding capacity of 5,000 ft^3/s for the INL diversion dam the annual exceedance probability is 0.0002 (or a 5,000-year return period).

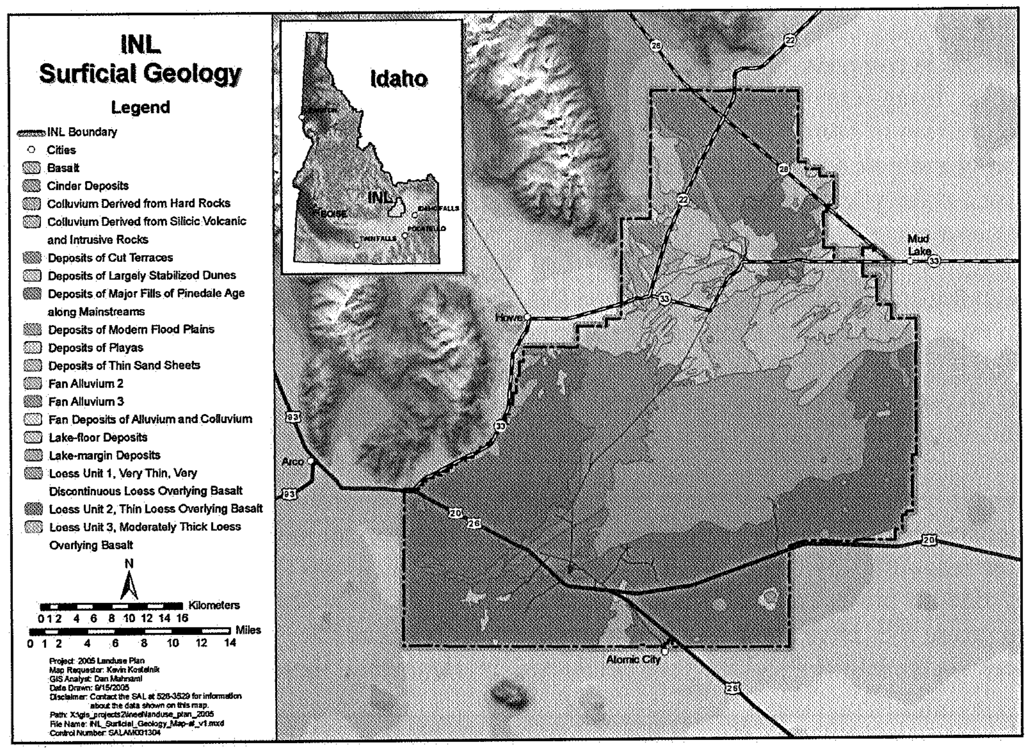

Figure 20. INL surficial geology.

5.9 Waste Area Groups

The EPA listed INL on the National Priorities List of the *National Oil and Hazardous Substances Pollution Contingency Plan* in November 1989. At that point, INL became subject to environmental remediation efforts under CERCLA (see Reference 1). According to current environmental remediation schedules, INL is expected to complete its major environmental remediation efforts by 2035 (see Reference 2). Projected end-states, which are developed consistent with DOE policy, are also presented.[55] During cleanup activities, site use within the waste area groups will continue to be industrial use.

Environmental remediation activities are estimated to continue until 2035, however, a significant amount of this activity is scheduled to be accomplished by 2012. As a result, INL facility infrastructure will also be reduced over the next 10 years. These footprint reductions will occur within existing operations areas. Included in this scenario is the transformation of existing operations areas to decommissioned and institutionally controlled areas. Use of the RWMC will gradually diminish as future disposal of waste ceases and cleanup of existing areas is completed. Some waste management activities, such as the Advanced Mixed Waste Treatment Project, may continue. Activities at INTEC will also be reduced as the tank farm is closed, sodium bearing wastes are treated and disposed, and storage pools are remediated. It is anticipated that future activities at TAN will focus primarily on Special Manufacturing Capability (SMC) facilities. The use of CFA is expected to diminish with only a few key facilities including the fire station, medical facility, and utilities areas expected to remain open after 2015. New missions and activities for RTC, MFC, and STC campuses and other Sitewide facilities are not defined to a point where impacts to land use can be assessed. More details are available in the TYSP and the *INL Infrastructure Transformation Plan.*

Following environmental remediation efforts, many sites will require long-term stewardship because residual contamination will remain at levels that prohibit unrestricted access. INL will have

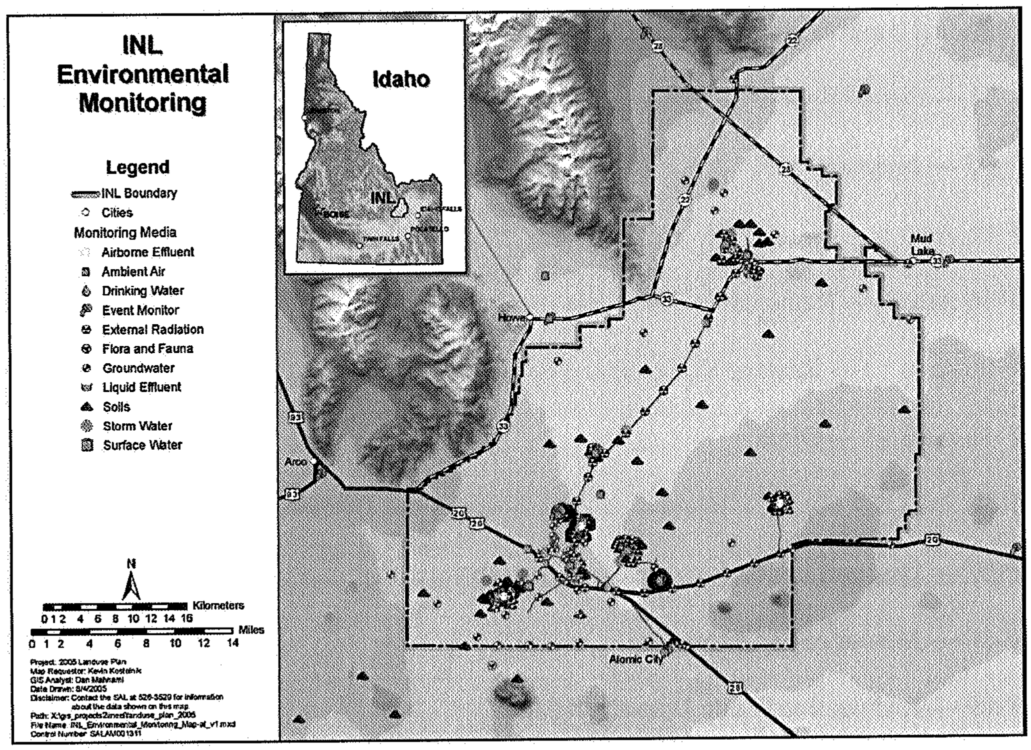

Figure 22. INL environmental monitoring.

5.9.1 WAG 1 — Test Area North (TAN)

TAN is a 31-km^2 (12 mi^2) area located in the northern portion of INL, approximately 80 km (50 mi) northwest of Idaho Falls. The U.S. Air Force and AEC Aircraft Nuclear Propulsion Program, which supported nuclear-powered aircraft research, originally built TAN between 1954 and 1961. After that research was terminated in 1961, the major program at TAN was the Loss-of-Fluid Test, which performed reactor safety testing and behavior studies. The Loss-of-Fluid Test program ended in 1985. Beginning in 1980, the area was also used to conduct work with material from the Three-Mile Island reactor accident; that work was completed in 2001.

5.9.1.1 Current State of WAG 1. Two active facilities currently reside at TAN: the Contained Test Facility and the Technical Support Facility (TSF). Two inactive areas, the Water Reactor Research Test Facility (WRRTF) and the Initial Engine Test area, also exist as well as a fire station and a cafeteria.

The U.S. Army sponsors the major program now located at the Contained Test Facility. This program, known as Specific Manufacturing Capability, produces military armor.

There are 94 potential CERCLA release sites within WAG 1. Eighty-three release sites were determined not to pose an imminent and substantial endangerment to human health and the environment based on a residential scenario. Of these 83 CERCLA sites, 77 are No Action, and 6 are No Further Action.

For more information about the status of cleanup at TAN, see *Summary of Cleanup at the Idaho National Laboratory* (see Reference 2).

- TSF–55 — Soil in pipe trench west of TAN-666
- WRRTF-01 — Burn Pits II and IV.

For a complete description of each institutional control, see Reference 13.

5.9.1.2 End State for WAG 1. By 2021, all facilities at TAN with no identified future use will be dispositioned. Nineteen excess facilities, all minor structures, and two high-risk facilities will be demolished, resulting in their complete elimination from the TAN footprint by the end of 2008.

The two high-risk facilities, TAN-607 Hot Shop Complex and TAN-650 Loss-of-Fluid-Test Facility, are expected to contain mercury, depleted uranium, transuranic, and RCRA hazardous constituent contamination. Both facilities have contaminated piping and ducts, sumps, drains, and heavy lifting equipment. The 2 high-risk and 19 excess facilities will be demolished by the end of 2008. No new facilities will be built.

Four facilities housing continuing operations at TAN will be safely operated until no longer needed, including the TAN industrial waste landfill (which will either be transferred to INL, privatized, or closed in 2008) and three groundwater treatment structures (which will be removed by the end of 2011 with the exception of SMC and support facilities and structures).

Four buildings at TAN have been designated as signature properties for their historic significance. They are TAN-607 (Manufacturing and Assembly Building), TAN-629 (Nuclear Airplane Hanger), TAN-630 (Loss-of-Fluid Test Control Building), and TAN-650 (Loss-of-Fluid Test Dome). TAN-607, TAN-630, and TAN-650 are all being removed. The final disposition of TAN-629 has not yet been determined.

Some release sites may require institutional controls depending on the results of a CERCLA 5-year review. For example, by 2035 the in situ bioremediation and pump-and-treat portions of the groundwater remediation and monitored natural attenuation are anticipated to be ongoing. Therefore, institutional controls will be maintained until the entire plume reaches the remedial action objectives.

5.9.2 WAG 2 — Test Reactor Area (TRA)/ Reactor Technology Complex (RTC)

The TRA was established in the early 1950s to study the effects of radiation on materials, fuels, and equipment. It is located in the south-central portion of the INL Site. Three major reactors have been built at TRA, including the Materials Test Reactor (MTR), which operated from 1952 to 1970; the Engineering Test Reactor (ETR), which operated from 1957 to 1982; and the Advanced Test Reactor (ATR), which began operations in 1967 and is the only major operating reactor at TRA. An additional test reactor, the ATR Criticality Facility at TRA, was a full-scale, low-power version of the ATR designed to provide physics data.

5.9.2.1 Current State of WAG 2. There are currently 89 buildings at TRA. The MTR building (TRA-603), which housed the world's first materials test reactor, has been designated a signature property for its historic value. The ETR and MTR have both been deactivated. Both facilities have also been defueled, but the reactor vessels are still in place. Remediation of the MTR canal is in progress. The ETR building is currently not being used. The MTR building is currently used for a variety of activities including office space, special projects, and warehouse facilities. Cleanup activities at the ETR and MTR buildings are scheduled to be completed by 2020.

TRA-13SCA, and the three PCB-contaminated sites will be required in 2035 at completion of the Office of Environmental Management cleanup mission. TRA-13SCA and TRA-15 are expected to be available for unrestricted industrial use at that time, but controls will still be needed to prohibit residential use.

It is anticipated that institutional controls will be discontinued at the following sites within 30 years: TRA-04 (the Warm Waste Retention Basin surficial sediments), TRA-08 (the Cold Waste Disposal Pond), TRA-34 (soil at North Storage Area), and TRA-X (soil contamination at Hot Tree Site).

5.9.3 WAG 3 – Idaho Nuclear Technology & Engineering Center (INTEC)

Situated in the south-central portion of INL, INTEC began receiving, storing, and reprocessing nuclear materials in 1953. Historically, INTEC has been a uranium reprocessing facility for irradiated nuclear fuel from test, defense, and research reactors in the United States and other countries. After fuel dissolution and extraction, high-level liquid waste was stored in stainless steel underground tanks in the tank farm. The high-level liquid waste was calcined, and the resultant granular solids (calcine) were stored in stainless steel bins encased in thick concrete vaults. In 1992, DOE announced that the reprocessing component of the INTEC mission would be phased out. This decision led to the phaseout of all related processes at INTEC. Other missions have included research, storage of spent nuclear fuel, and waste management.

5.9.3.1 WAG 3 Current State. The current mission of INTEC is to receive and store spent nuclear fuel and to store and treat radioactive and mixed waste. There are approximately 290 facilities in the plant area. The types of buildings include administrative, maintenance, process, storage, laboratory, and special use and comprise roughly 1.2 million ft^2. INTEC may be the future site of additional RH-TRU waste processing but this has not yet been determined.

The current strategy at INTEC is as follows:

- Eliminate risks to the Snake River Plain Aquifer. By 2012, sodium-bearing waste will be treated and disposed, the tank farm will be closed and capped, high-risk facility source terms will be removed or isolated, and high-risk facilities will be either demolished or fully prepared for final demolition.

- Continue safety and compliance in adherence to all regulatory requirement and commitment. Integrated safety management is embedded in all stages of work scope definition, planning, and performance. Hazards are clearly identified and controls established through direct involvement by workers and management.

- Expedite consolidation of EM spent nuclear fuel from wet to dry storage, complete active spent nuclear material cleanup scope. Disposition EM excess nuclear materials by 2007.

- Substantial reduction of EM footprint and costs, through aggressive utility and infrastructure cost reductions and efficiencies, along with completion of excess facilities demolition.

WAG 3 has been further divided into seven groups according to shared characteristics or common contaminant sources, and a single remedy was identified for all release sites within a given group. The seven groups are described below.

Group 1—Tank Farm Soil Interim Action. The Tank Farm soils represent a risk due to direct radiation exposure to workers or the public; and due to the potential leaching and transport of contaminants to perched water or the Snake River Plain Aquifer, a sole source aquifer. A final remedy for

5.9.3.2 WAG 3 End State. The INTEC 2035 end state requires that all spent nuclear fuel be removed from the State of Idaho and shipped to an off-Site repository by January 1, 2035; all sodium-bearing liquid high-level waste be converted to calcine by December 31, 2012; and all calcined high-level waste treatment be completed so that it is ready to be moved out of Idaho for disposal by a target date of 2035. For more information about ongoing cleanup activities, see *Summary of Cleanup at the Idaho National Laboratory* (see Reference 2).

5.9.4 WAG 4 — Central Facilities Area (CFA)

Located in the south-central portion of INL, CFA has been used since 1949 to house many of the support services for all the operations at INL. Functions housed at CFA include laboratories, security operations, fire protection, a medical facility, communication systems, warehouses, a cafeteria, vehicle and equipment pools, and the bus system. Fifty-two potential release sites were addressed by three CERCLA Records of Decision (ROD), which were issued in 1992, 1995, and 2000. These sites include landfills, spills, ponds, storage tanks, dry wells, a sewage treatment plant, and buildings and structures. Additional information about all these sites is presented in the *Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13*.[58]

5.9.4.1 WAG 4 Current State. As a result of residual contamination, there are six sites at CFA that require institutional controls. These include: CFA-01—Landfill; CFA-02—Landfill; CFA-03—Landfill; CFA-04—Disposal Pond; CFA-07—French Drain; CFA-08—Sewage Plant Drain Field; and CFA–54—Buried pipe near CFA-674.

For a complete description of each institutional control, see Reference 13.

5.9.4.2 WAG 4 End State. The CFA-08 Sewage Treatment Plant Drain field will remain under institutional control until radioactive decay reduces the cesium-137 concentration to below risk-based levels in about 185 years. Institutional controls may also still be required at the CFA landfill sites and at CFA-07 (French Drain site) to prevent intrusion (drilling and excavation) in these areas.

Seven buildings at CFA have been designated as signature properties for their historic value. These buildings were constructed between 1942 and 1945 and were used to house military personnel and otherwise support World War II activities. They include: CFA-606 marine barracks; CFA-607 commanding officer's house and CFA-632 commanding officer's garage; CFA-613 officers' quarters; CFA-633 proofing area, which includes the containment wall, gun emplacements, and gantry crane; and the CFA-642 and CFA-651 pump houses. The disposition of these buildings has not yet been determined.

5.9.5 WAG 5 — Power Burst Facility & Auxiliary Reactor Area/Critical Infrastructure Test Range Complex (CITRC)

The PBF and the Auxiliary Reactor Area (ARA) were both experimental reactor facilities built in the 1950s. The two facilities are located in the same general area and together comprise WAG 5.

The ARA-I facility was built in 1957 to support the Stationary Low-Power Reactor No. 1 (SL-1). The SL-1 reactor was built at ARA-II in 1957 and operated intermittently from 1958 until it was destroyed by a nuclear accident in January 1961. At that time, ARA-I became the staging area for the emergency response to the 1961 SL-1 reactor accident and cleanup. Construction of the ARA-III facility was completed in 1959 to house the Army Gas-Cooled Reactor Experiment research reactor. That reactor was deactivated in 1961, and the facility was modified in 1963 to support the ARA-IV reactor until the Army Reactor Program was phased out in 1965. The ARA-IV facility was built to accommodate the Mobile Low-Power Reactor I and was active from 1957 until 1964. The Nuclear Effect Reactor at

BORAX-02—Site of Buried BORAX I, BORAX-08—BORAX V Ditch, and BORAX-09—Entombed BORAX II through V Reactor Buildings.

5.9.6.2 WAG 6 End State. All the BORAX sites and the Organic-Moderated Reactor Experiment (more)-01 leach pond site are expected to remain under institutional control beyond 2035 until the cesium-137 decays to acceptable levels. It also is anticipated that institutional controls may remain in effect for the EBR-08 Fuel Oil Tank site past 2035.

For a complete description of each institutional control, see Reference 13.

5.9.7 WAG 7 — Radioactive Waste Management Complex (RWMC)

The RWMC is located in the southwestern corner of INL. The facility encompasses a total of 177 acres and is divided into three separate areas by function: the Subsurface Disposal Area (97 acres), the Transuranic Storage Area (58 acres), and the Administration area (22 acres). The mission of the facility from 1952 to 1970 was to manage disposal of radioactive waste. Since 1970, the mission has been to dispose of low-level waste and to store, treat, and prepare stored transuranic waste for off-Site shipment and disposal (see Reference 2). Recent construction of the Advanced Mixed Waste Treatment Project expanded the RWMC waste management operations to include treating and preparing the 62,000 m^3 of stored transuranic waste for shipment out of Idaho.

The cleanup goals for WAG 7 are as follows:

- Remediate the SDA
- Dispose of 300,000 m^3 of low-level/low-level mixed waste
- Dispose of 7,500 m^3 of contact-handled transuranic waste
- Dispose of 85 m^3 of remote-handled transuranic waste
- Demolish 47 excess facilities.

5.9.7.1 WAG 7 Current State. Three RODs have been signed for RWMC. These include *Record of Decision for Pit 9 at the Radioactive Waste Management Complex Subsurface Disposal Area at the Idaho National Engineering Laboratory,*[60] *Record of Decision: Declaration for Organic Contamination in the Vadose Zone Operable Unit 7-08, Idaho National Engineering Laboratory, Radioactive Waste Management Complex, Subsurface Disposal Area,*[61] and *Record of Decision for Pad A at the Radioactive Waste Management Complex Subsurface Disposal Area at the Idaho National Engineering Laboratory.*[62] Vapor vacuum extraction activities are ongoing in OU 7-08.

5.9.7.2 WAG 7 End State. Current plans call for disposal of low-level waste in the Subsurface Disposal Area to be discontinued by 2009. Stored waste at the TSA will be retrieved and shipped off-Site by 2018. Because RWMC has not been identified as an NE mission area, it is anticipated that the buildings and infrastructure will be removed by 2035. No remediation is anticipated to be required in the administration and operations areas beyond building demolition.

The full extent of environmental contamination at RWMC is being investigated. Decisions to remediate the contamination will be based on regulatory requirements and risk to human health and the environment. The comprehensive ROD for the entire RWMC, including the buried waste area, is currently scheduled to be issued in 2008 (see Reference 2).

Operations Office administered MFC facilities until February 1, 2005, when the DOE Idaho Operations Office became the administrator of the MFC.

5.9.9.1 WAG 9 Current State. Thirty-seven release sites were evaluated in the *Final Comprehensive Remedial Investigation/Feasibility Study for ANL-W Operable Unit 9-04 at the INL.* The Final ROD for Operable Unit 9-04 was signed on September 29, 1998. An Explanation of Significant Difference for the Record of Decision for Operable Unit 9-04 was approved in June 2004.

Three primary areas were identified as having contamination that may present risk to human health or the environment. These areas include the Sanitary Sewage Lagoons (ANL-04), Industrial Waste Pond, (ANL-01), Interceptor Canal (ANL-09). The remaining sites were determined to have acceptable risk to human health and the environment and, therefore, required no action (see Reference 2).

5.9.9.2 WAG 9 End State. Three sites continue to pose an unacceptable risk to occupational receptors. These sites include the Interceptor Canal, the Interceptor Canal excavated soil mound, and the Industrial Waste Pond. The Interceptor Canal soil mound and the Interceptor Canal ditch will remain occupational health risk sites while the cesium-137 contamination decays to background levels by 2099 and 2087, respectively. The Industrial Waste Pond Sediments contain residual cesium-137 contamination that will decay to background levels by 2035.

Institutional controls are currently in place at these sites and provide protection for human receptors. The institutional controls at the sites include postings to prevent access, access control for general public by location on INL, and ANL-W procedure document precautions to be taken while working near these areas (see Reference 2).

5.9.10 WAG 10 — Miscellaneous

WAG 10 encompasses all areas that fall outside of the other WAGs. Hazards associated with WAG 10 include potential unexploded ordnance and associated explosive contaminants remaining from munitions testing activities. The hazard area is extensive, composed of approximately 217,000 acres. As necessary, WAG 10 also encompasses areas beyond the INL boundaries that may have been impacted by INL activities. Consequently, WAG 10 comprises a large area, much of which is uncontaminated.

5.9.10.1 WAG 10 Current State. Institutional controls in place for WAG 10 include: Organic Moderated Reactor Experiment (OMRE)-01, OMRE Leach Pond; STF-02, Gun Range; and multiple sites with potential unexploded ordnance (ORD-03, CFA-633, Naval Firing Site and Downrange Area; ORD-09, Twin Buttes Bombing Range; ORD-01, Arco High-Altitude Bombing Range, TNT- and RDX-contaminated soil sites; ORD-15, Experimental Field Station; ORD-10, Fire Station II Zone and Range Fire Burn Area; ORD-24, Land Mine Fuze Burn Area; ORD-08, National Oceanic and Atmospheric Administration; ORD-06, Naval Ordnance Disposal Area; and ORD-21, Juniper Mine).

5.9.10.2 WAG 10 End State. The WAG 10 ROD requires remediation of the ordnance sites by November 2015. The selected remedy involves visual and geophysical surveys of the areas that have been identified as having a higher risk of containing unexploded ordnance. However, there are limits to the effectiveness of these methodologies. In addition, because of freeze-thaw cycles, ordnance continues to work its way up to the surface over the years. These limitations, coupled with the large geographic area that potentially may contain unexploded ordnance, make it very difficult to free release areas, as it is not possible to ensure that every potential piece of unexploded ordnance has been identified. Therefore, even if these sites are remediated as scheduled, they may still require permanent institutional controls (access controls) to protect humans from potential contact with unexploded ordnance.

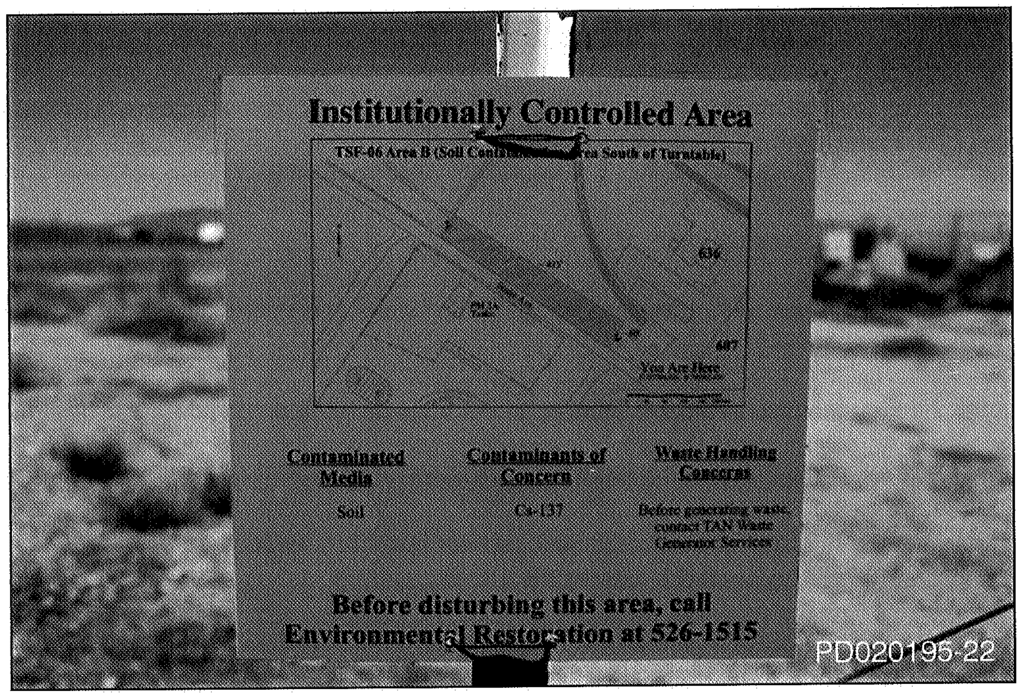

Figure 23. Institutionally controlled area marker.

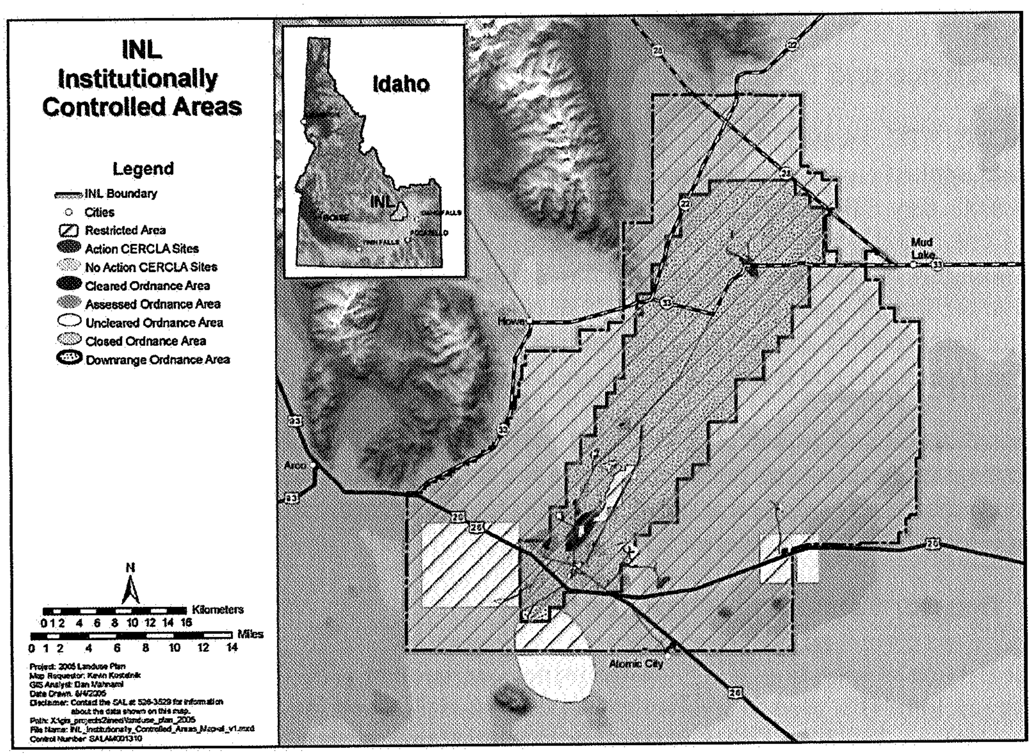

Figure 24. INL institutionally controlled areas.

Additional missions are being considered for the RTC, and the necessary facilities to complete these new missions are being evaluated at this time. Refer to the *INL Infrastructure Transformation Plan* for additional information (see Reference 55).

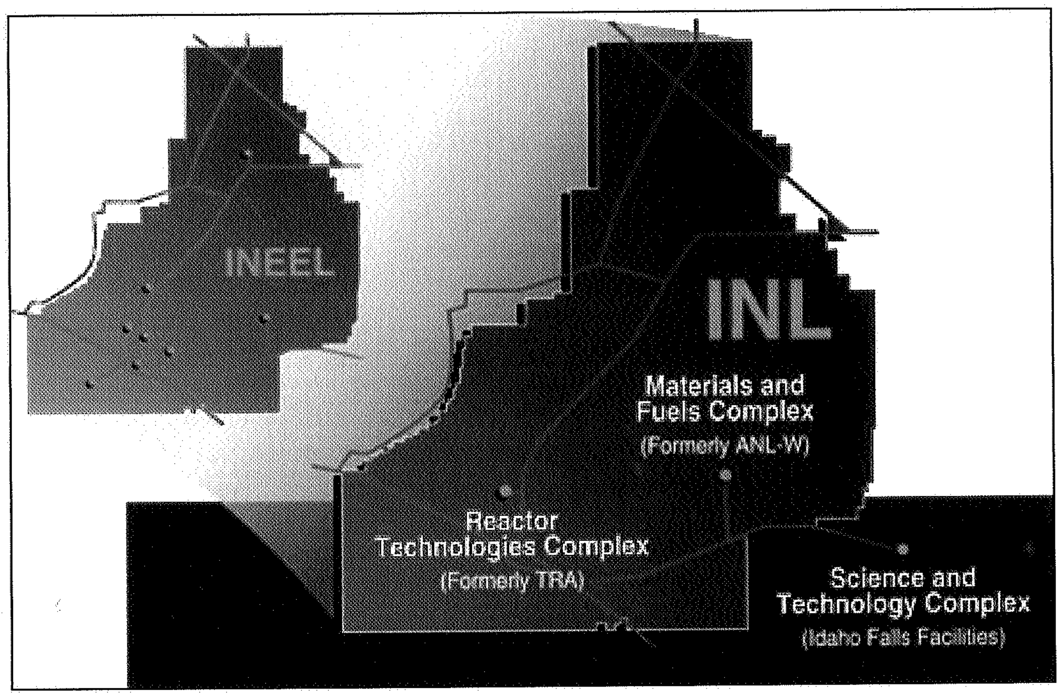

Figure 25. INL campuses.

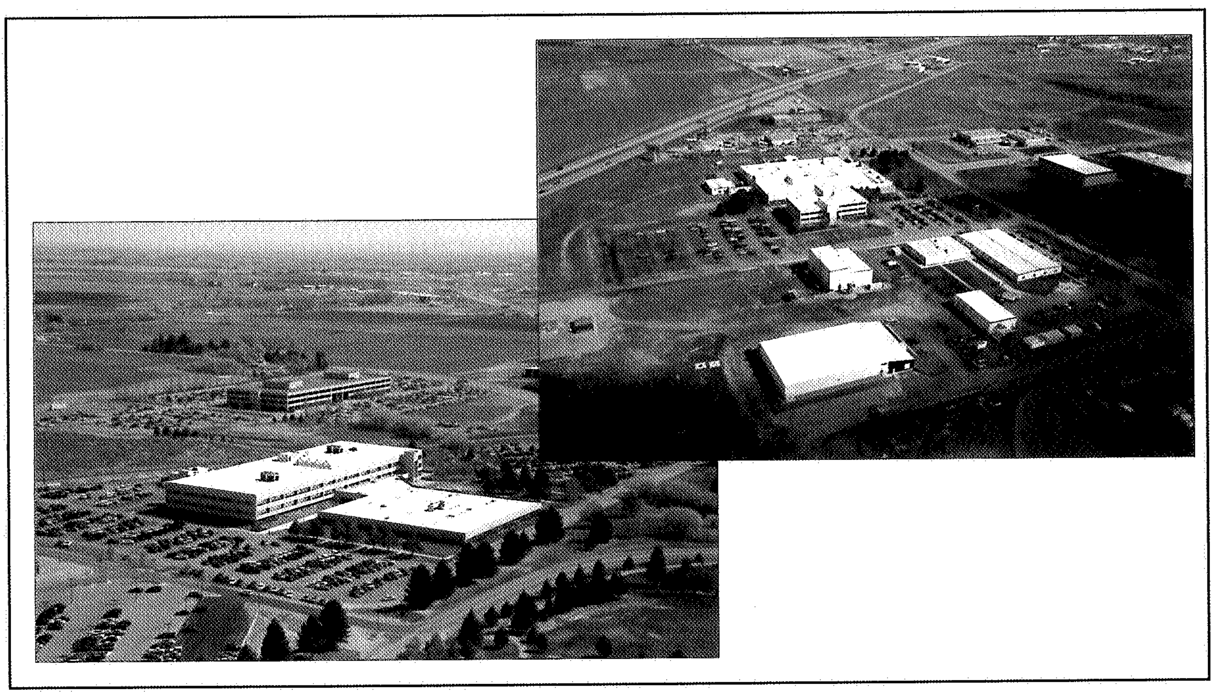

Figure 26. INL Science and Technology Campus.

- The Transient Reactor Test Facility and Zero Power Physics Reactor (two test reactors)
- The new Space and Security Power Systems Facility.

Additional missions are being considered for the MFC, and the necessary facilities to complete these new missions are being evaluated at this time.[64] Refer to the *INL Infrastructure Transformation Plan* for additional information (see Reference 55).

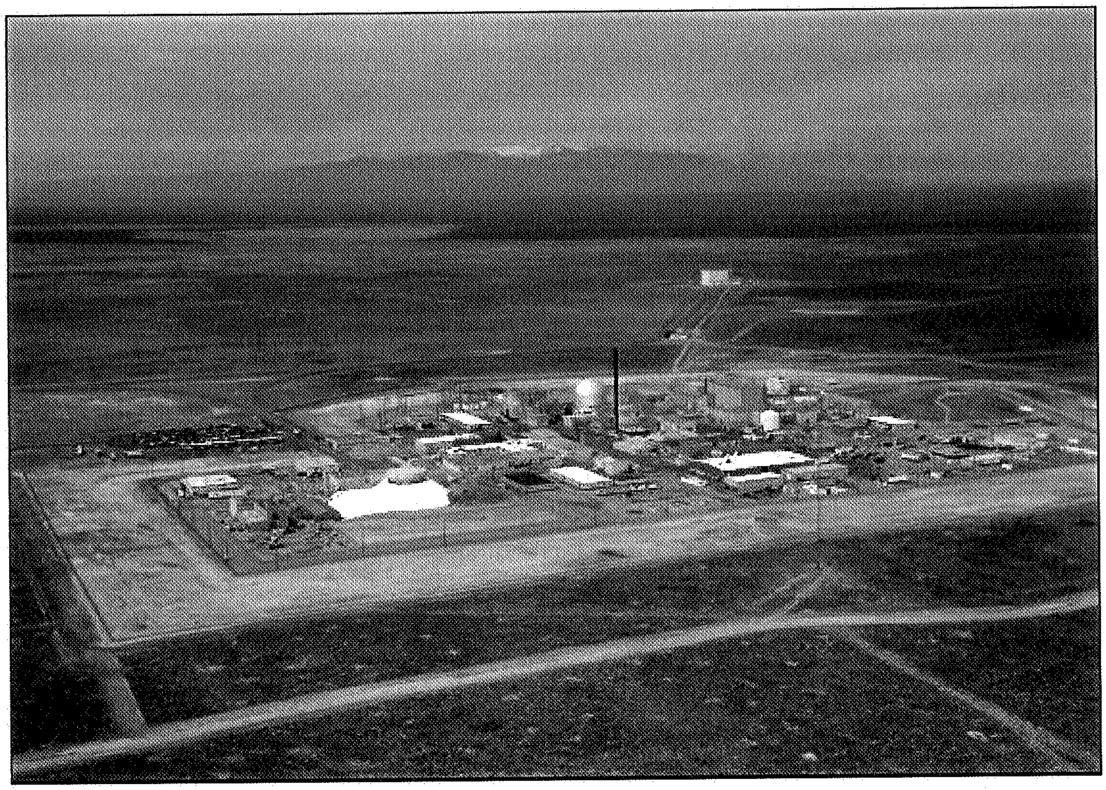

Figure 28. INL Materials and Fuels Complex.

6.1 Summary of Current INL Land Use Conditions

The entire area comprising INL remains under administrative control, thus access to INL is restricted. Within this area, the current land use conditions consist of industrial areas connected with transportation corridors, vegetated desert and rangelands, wetland and surface water drainage areas, and barren lands. Portions of the vegetated lands are used for grazing, controlled hunting, and ecological preservation. There are no row crop agricultural or residential uses of the INL land. Figure 29 provides a summary of these current land use conditions.

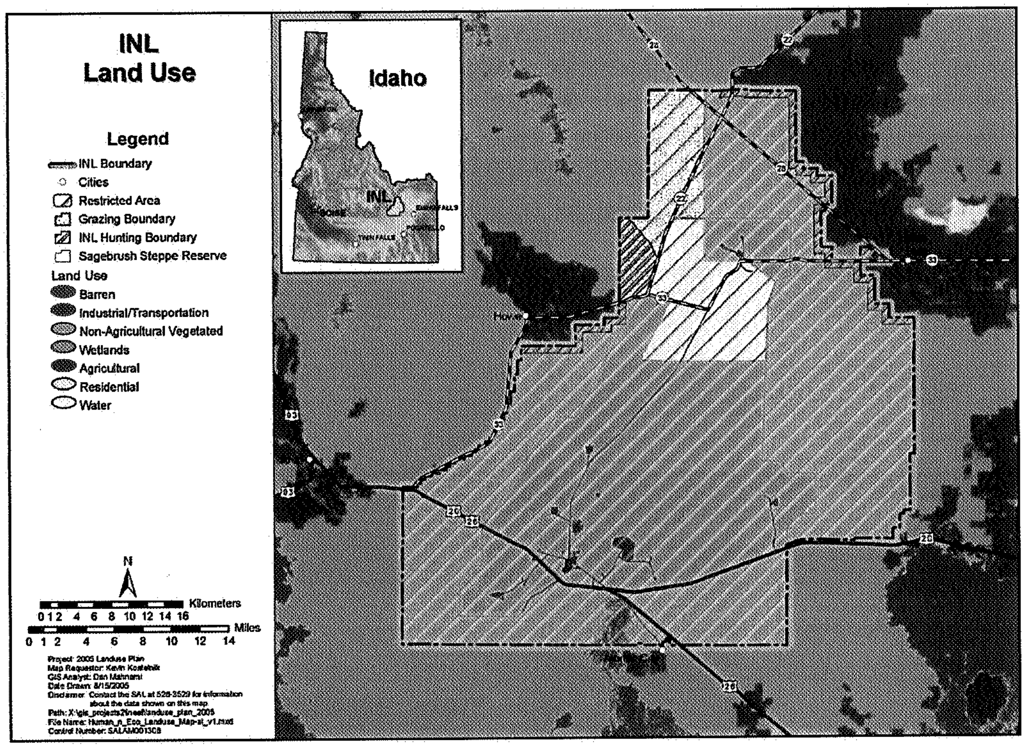

Figure 29. INL land use.

6.3 INL Land Use at 2035

Land use changes within the next 30 years (Figure 31) are anticipated to be consistent with the 10-year forecast. Specific changes beyond the 10-year horizon include completion of a number of critical environmental remediation efforts. These achievements are noted in the transition of *Operations/Decommissioning Areas* to that of *Decommissioned Areas*. *New Development Areas* (RTC and MFC) will continue to serve as the operational staging areas for current and new development within the *Core Infrastructure Area*.

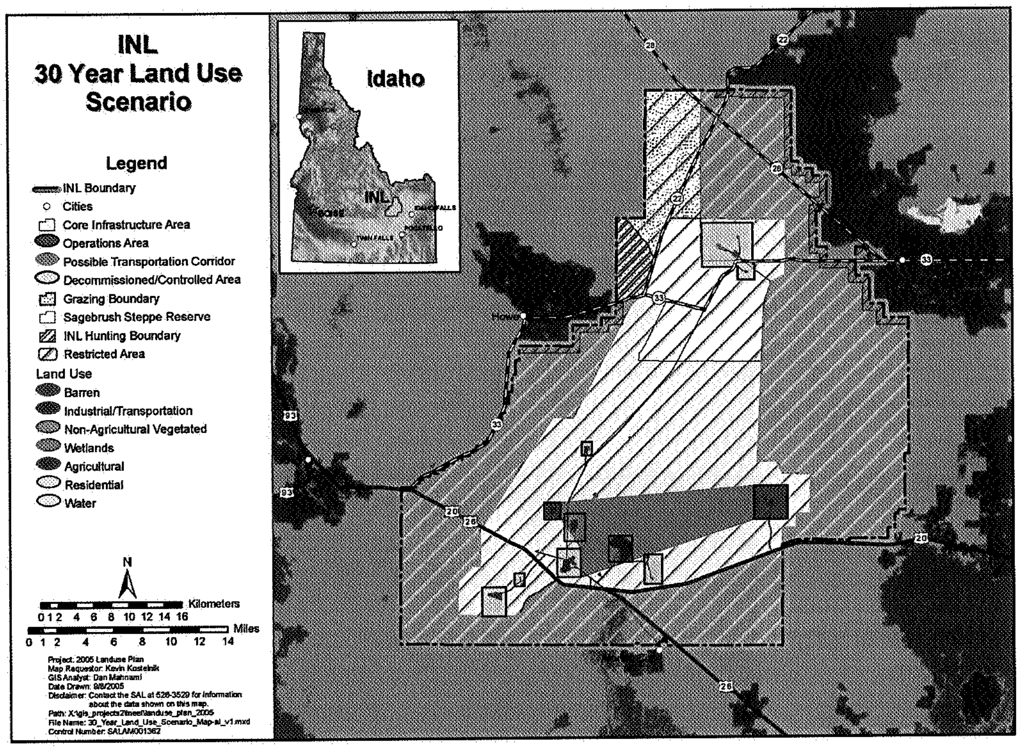

Figure 31. INL 30-year land use scenario.

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